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2008 ANNUAL PROGRESS REPORT

for

**Former Fairchild Building 18
644 National Avenue
Middlefield-Ellis-Whisman Study Area
Mountain View, California**

prepared for

Schlumberger Technology Corporation

225 Schlumberger Drive

Sugar Land, TX 77478

June 15, 2009





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submitted to

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June 15, 2009
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ACRONYMS AND ABBREVIATIONS

106 Order	Administrative Order for Remedial Design and Remedial Action
cis-1,2-DCE	cis-1,2-dichloroethene
cm/sec	centimeter per second
DHS	Department of Health Services
Fairchild	Fairchild Semiconductor Corporation
Ft	Feet
ft bgs	feet below ground surface
FS	feasibility study
former Building 18	644 National Avenue
GAC	granular activated carbon
gpm	gallons per minute
GWETS	groundwater extraction and treatment system
IRM	Interim Remedial Measure
K	hydraulic conductivity
µg/L	micrograms per liter
mg/kg	milligram per kilogram
MEW	Middlefield-Ellis-Whisman
MCLs	maximum contaminant levels
NASA	National Aeronautics and Space Administration
NPDES	National Pollutant Discharge Elimination System
PCE	Tetrachloroethene
PRPs	potentially responsible parties
QA/QC	quality analysis and quality control
RGRP	Regional Groundwater Remediation Program
RI/FS	remedial investigation and feasibility study
ROD	Record of Decision
SCRWs	source control recovery wells
SCVWD	Santa Clara Valley Water District
Water Board	California Regional Water Quality Control Board, San Francisco Bay Region
Weiss Associates	Weiss

System 1	515 Whisman Road
The Site	644 National Avenue, Mountain View, California
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds
VC	vinyl chloride

SUMMARY

This 2008 Annual Progress Report for the former Fairchild Semiconductor Corporation (Fairchild) Building 18 located at 644 National Avenue in Mountain View, California (the Site) contains a summary of Site activities from January 1 through December 31, 2008 and analytical data for the past five years. This report is submitted in accordance with Section XV of the 1990 Administrative Order for Remedial Design and Remedial Action (106 Order) issued by the United States Environmental Protection Agency (USEPA), Section XI of the Consent Decree entered in Action No. 20275 (N.D. Cal.) in 1992 (Consent Decree) and the USEPA's correspondence prescribing 2004 and future Annual Report contents (USEPA, 2005).

The groundwater extraction and treatment system (GWETS) at Building 18 consists of one Source Control Recovery Well (SCRW), RW-25A, screened in the A-zone. Groundwater from this well is plumbed via double-contained piping to Fairchild Treatment System 1, located at 515 Whisman Road (System 1), which consists of three 5,000-pound granular activated carbon (GAC) vessels in series. In addition, groundwater removed by a dewatering sump system in the basement of Building 18 is also conveyed to and treated by System 1. System 1 discharges treated groundwater to the storm drain system under National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2004-0055 that expires June 2009. Five groundwater monitoring wells are currently used to evaluate the progress of the remedy at the Site. These monitoring wells are sampled annually and water levels are collected semi-annually.

Site activities conducted in compliance with the 106 Order during this reporting period included continued operation, monitoring and maintenance activities of the Building 18 GWETS, and submitting an Optimization Evaluation to the USEPA for the Fairchild Sites on September 3, 2008.

Monitoring data collected during 2008 demonstrates that RW-25A continues to achieve adequate horizontal and vertical capture based on converging lines of evidence, including graphical flow net analysis and chemical concentration trends. Graphical flow net evaluation in March and November indicated greater horizontal capture than the target capture. VOC concentrations in groundwater continue to remain well below historical maximums, and show a long-term decreasing trend.

The 644 National Avenue property was sold and Building 18 was vacated in December 2007. Redevelopment plans are being reviewed by the City of Mountain View, and active coordination with the developer continued to occur during 2008. The Interim Remedial Measure installed in the basement of Building 18 to mitigate the vapor intrusion pathway was shut down after the building was vacated. The Building 18 basement dewatering system remained operational during 2008.

1. INTRODUCTION

This 2008 Annual Progress Report contains a summary of activities from January 1 through December 31, 2008 at the former Fairchild Semiconductor Corporation (Fairchild) Building 18 located at 644 National Avenue in Mountain View, California (the Site; Figure 1). This report is submitted in accordance with Section XV of the 1990 Administrative Order for Remedial Design and Remedial Action (106 Order) issued by the United States Environmental Protection Agency (USEPA), Section XI of the Consent Decree entered in Action No. 20275 (N.D. Cal.) in 1992 (Consent Decree) and the USEPA's correspondence prescribing 2004 and future Annual Report contents (USEPA, 2005). Weiss Associates (Weiss) prepared this report on behalf of Schlumberger Technology Corporation, and Geosyntec Consultants (Geosyntec) contributed to the content of this report.

1.1 Site Background

The Building 18 Site is located at 644 National Avenue, an industrial/commercial area in Mountain View California. Building 18 functioned as an electroplating facility for Fairchild Semiconductor Corporation from 1966 to 1984. The primary constituent of concern at the Site is trichloroethene (TCE) in groundwater from historical underground tanks/piping, sumps and/or surface spills (106 Order).

The Site is located within the Middlefield-Ellis-Whisman (MEW) area, an approximately ½-square-mile area bounded by Middlefield Road on the south, Ellis Street on the east, Whisman Road on the west, and Highway 101 on the north. Work is performed under a November 1990 Administrative Order for Remedial Design and Remedial Action (106 Order) issued by USEPA, and Section XI of the Consent Decree entered in Action No. 20275 (N.D. Cal.) issued in 1992 (Consent Decree). The RI/FS was completed in 1988 (HLA, 1987; Canonie, 1988), with the USEPA issuing a Record of Decision (ROD) in 1989. The ROD and two subsequent Explanations of Significant Differences (ESDs) specify the remedial actions for the MEW area (USEPA, 1989, 1990, 1996a).

Remediation within the MEW area includes facility-specific activities by individual PRPs, (such as Building 18), and a Regional Groundwater Remediation Program (RGRP) that addresses co-mingled volatile organic chemicals (VOCs) that have migrated beyond the facility-specific areas and cannot be attributed to a single source. One of two RGRP treatment systems, the South of 101 Treatment System, is located at 644 National Avenue but is not part of the Building 18 remedy and is discussed in the Annual Report for the RGRP program (Weiss, 2009b).

The 644 National Avenue property has been bought by Carr America National Avenue LLC; redevelopment plans include new buildings and a parking structure. There is active coordination with the developer to maintain extraction wells, conveyance piping, and monitoring wells at 644 National Avenue, as well as the RGRP South of 101 Treatment System.

1.2 Local Hydrogeology

Subsurface geology consists of interbedded sediments ranging in grain size from silty clay to sandy gravel. The water-bearing zones defined at the MEW area are summarized below:

Groundwater Zones	Approximate Depth Interval Below Ground Surface
A ^a	0 to 45 feet
B1 ^b	50 to 75 feet
B2	75 to 110 feet
B3	120 to 160 feet
C	200 to 240 feet
Deep Aquifer	>240 feet

^a Navy and NASA refer to this zone as A1 zone north of Highway 101.

^b Navy and NASA refer to this zone as A2 north of Highway 101.

> = greater than

The upper groundwater zone at the MEW area, defined as the saturated zone above the B/C aquitard, occurs from the top of the saturated zone to a depth of approximately 165 ft bgs south of Highway 101 and generally less than 100 ft bgs north of Highway 101. The B/C aquitard is the major confining layer beneath the MEW area. The upper groundwater zone is subdivided into two units, the A-zone and the B-zone, which are separated by the A/B aquitard. The B aquifer has been further subdivided into three zones. From youngest to oldest, these are the B1-, B2-, and B3-zones, separated by aquitards, designated as the B1/B2 aquitard and the B2/B3 aquitard. The lower groundwater zones occur below the B/C aquitard, from about 200 ft bgs. Two lower groundwater zones have been defined: the C-zone and what has been termed the Deep Aquifer (HLA, 1987; Intel, 1987).

Ranges of hydraulic conductivity (K) hydraulic gradient, and Transmissivity of the upper aquifer zone i.e., above the B3/C aquitard, calculated from pumping tests conducted at the MEW Site from 1986 through 2005¹ as presented below:

Water-Bearing Zone	Estimated Hydraulic Conductivity (ft/day)		Approximate Horizontal Gradient (ft/ft)	Saturated Thickness (ft)	Transmissivity (ft ² /day)	
	Low	High			Low	High
A-zone	6	480	0.004	15	44	4,400
B1-zone	20	260	0.003	25	150	2,600
B2-zone	0.4	5	0.002 to 0.005	35	2	230
B3-zone	0.5	5	0.001 to 0.002	40	5	130

¹ References are Canonie 1986a, 1986b 1987 & 1988, Geomatrix 2004, HLA 1986 & 1987, Locus 1998, PRC 1991, Navy 2005 and Weiss Associates 1995.

Currently and historically, the lateral component of groundwater flow beneath the Site is generally towards the north during non-pumping and pumping conditions.

1.3 Description of Remedy

The *Final Revised Report for Source Control Remedial Design, Basis of Design, Contract Documents, Specifications and Drawings for Fairchild Building 18*, dated September 2, 1994, (Canonie 1994) presents figures of the following activities:

- Soil removal and off-site aeration in the northwest corner of the property that extended on to adjacent properties, with dimensions of approximately 80 feet long by 50 feet wide and 13 feet deep;
- Groundwater extraction well in the vicinity of the soil removal (RW-25A), piping and other appurtenances for off-site treatment at Fairchild Treatment System 1²; and,
- Monitoring well network, consisting of the following six wells: 54A, 147A, 152A, 80A, 58A and 151A.

The purpose of the RW-25A source control recovery well (SCRW) and associated treatment system (System 1), is to control and remove VOCs in the facility-specific area.

Shallow soils exceeding the cleanup standard of 0.5 mg/kg of TCE were excavated in 1995. The Site is in the long term remedial action phase with continued extraction, treatment and monitoring of groundwater.

The Remedial Action Objectives (RAOs) for the MEW area are to (1) protect potential potable water supplies, (2) remediate or control the elevated concentrations of chemicals present in the localized vadose zone soils, and (3) remediate or control the groundwater that contains elevated concentrations of chemicals, including discharge of such groundwater into the surface water (Canonie, 1988).

The groundwater cleanup standards are 5 µg/L of TCE for the shallow aquifers and 0.8 µg/L TCE for the C and deep aquifers. The cleanup levels for the other VOCs listed in the ROD are:

- Chloroform – 100 µg/L;
- 1,1-dichloroethene – 6 µg/L;
- 1,1,1-trichloroethane – 200 µg/L; and,
- Vinyl chloride (VC) – 0.5 µg/L.

The maximum contaminant levels (MCLs) for the following chemicals of concern were not specified in the ROD: 1,2-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethene, Freon 113, phenol, and tetrachloroethene (PCE). The ROD states that the chemical ratio of TCE to other chemicals found at the Site is such that achieving the cleanup goal for TCE will result in cleanup of the other Site chemicals to at least their respective federal MCLs.

² Activities related to this treatment system are presented in the Annual Report for Former Fairchild Buildings 1-4 (Weiss, 2009a)

1.4 Summary of 2008 Site Activities and Deliverables

Site activities conducted in compliance with the 106 Order during this reporting period include:

- Continued quarterly reporting of System 1 discharges under NPDES Permit CAG912003;
- Continuing groundwater extraction and treatment;
- Monitoring the Site dewatering sumps for operation and flow rates;
- Collecting semi-annual groundwater elevation measurements in Site monitoring and extraction wells on March 27 and November 20;
- Distributing the 2007 Annual Progress Report to the USEPA and MEW Distribution List parties on June 15;
- Optimization Evaluation, Fairchild Sites on September 3, 2008;
- Collecting groundwater samples from Site monitoring and extraction wells in November;
- Annual settlement monitoring December 17;
- Assessing the progress of remedial actions during 2008; and,
- Planning remedial actions for 2009.

Section 2 of this report provides a summary of Site groundwater extraction and treatment system and remedial activities conducted during this reporting period. Section 3 documents additional activities during 2008. Sections 3-7 document additional activities, problems encountered, technical assessment, conclusions and recommendations, and a summary of remedial activities planned for calendar year 2009. Supporting data are presented in Figures 1 through 3, Tables 1 through 6, and Appendices A through C.

2. GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

2.1 System Description

2.1.1 Extraction & Treatment System

The *Revised Final Source Construction, Operation and Maintenance Plan, Fairchild Semiconductor Corporation, 644 National Avenue, Building 18* presents the remedial components for the Site (Canonie 1995). One SCRW operates in the A-zone at the Building 18 Site (RW-25A). In addition, groundwater is extracted by the dewatering sump system in the basement of the building. Groundwater from RW-25A and the basement dewatering sump are conveyed via double-contained piping to a treatment facility located at 515 Whisman Road (Fairchild Treatment System 1), which consists of three 5,000-pound granular activated carbon (GAC) vessels in series. System 1 discharges treated groundwater to the storm sewer under National Pollutant Discharge Elimination System (NPDES) Permit CAG912003, Order No. R2-2004-0055. Discussion of System 1 is provided in the 2008 Annual Progress Report for Former Fairchild Buildings 1-4 (Weiss, 2009a).

Monthly average flow rates and groundwater volumes extracted are provided in Tables 2 and 3, respectively. During 2008, RW-25A (Figure 2) operated near its target flow rate of 5.5 gallons per minute (gpm) without significant downtime. Well RW-25A extracted approximately 3.0 million gallons of groundwater in 2008, pumping at an average rate of 5.8 gpm (Table 2). During 2008, the basement dewatering sump system extracted approximately 15.8 million gallons of groundwater (Table 3), and the average flow rate of the sump system was 30.0 gpm (Table 2). Appendices B and C contain the laboratory analytic report and quality assurance/quality control (QA/QC) evaluation, respectively, for samples collected at the Site during 2008, and Table 4 provides a summary of chemical analytic results.

2.1.2 Monitoring Wells

There are currently five monitoring wells associated with the Building 18 Site and four wells are screened in the A-zone: wells 54A, 152A, 147A, and 80A. One well is screened in the B2-zone: well 36B2. These wells are sampled annually for VOCs, and water levels are collected semiannually. In comparing the current list of monitoring wells to those in the 1994 design documents described in Subsection 1.3 above, monitoring of Wells 151A and 58A was discontinued prior to 2002, and Well 36B2 was added prior to 2002. The remaining 4 wells are the same as listed in the design documents. Other monitoring wells at and near the Building 18 Site and are discussed in the RGRP annual report (Weiss, 2009b).

2.2 Extraction and Treatment System Operation and Maintenance

Annual routine maintenance consists of well inspections and as-needed repairs. There were no non-routine maintenance or repairs to RW-25A or conveyance piping during 2008.

The following non-routine maintenance or repair items occurred during 2008; all items are related to the Building 18 basement dewatering system:

Date	Component	Comments	Regulatory Notification
1/17/2008	Sump 3	Pump was replaced in Sump 3	Not Applicable
1/27/2008	Side Sumps	A high level alert for the Building 18 side sumps occurred on 1/27/2008, and was cleared on the same day after normal conditions were restored.	Not Applicable
1/30/2008	Main Sump	A high level alert for the Building 18 main sump occurred on 1/30/2008, and was cleared on the same day after normal conditions were restored.	Not Applicable
2/20/2008	Main Sump	A high level alert for the Building 18 main sump occurred on 2/20/2008, The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alert was reset the same day.	Not Applicable
2/24/2008	Main Sump	A high level alert for the Building 18 main sump occurred on 2/24/2008. The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alert was reset the same day.	Not Applicable
2/25/2008	Side Sumps	A high level alert for the Building 18 side sump (S-4) occurred on 2/25/2008, and was cleared on the same day after normal conditions were restored.	Not Applicable
3/9/2008	Main Sump	A high level alert for the Building 18 main sump occurred on 3/9/2008. The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alert was reset the same day.	Not Applicable
3/26/2008	Main Sump	Two high level alerts for the Building 18 main sump occurred on 3/26/2008. The secondary main sump pump automatically activated and was sufficient to prevent flooding. The alerts were reset the same day.	Not Applicable
3/27/2008	Side Sumps	A high level alert for the Building 18 side sump (S-5) occurred on 3/27/2008, and was cleared on the same day after normal conditions were restored. The alert was due to Sump-5 pump failure. The float and pump were replaced on the same day. No flooding problems occurred.	Not Applicable
4/12/2008	Main Sump	Problem with float switch. Reset and float switches on. No flooding problems occurred.	Not Applicable
4/16/2008	Main Sump	Problem with float switch. Reset and float switches on. No flooding problems occurred	Not Applicable
5/9/2008	Sump 4	False high level alarm reset on the same day. No flooding occurred.	Not Applicable

Date	Component	Comments	Regulatory Notification
6/16/2008	Main Sump	Main sump pump went offline due to power outage (coincided with power outage at South 101). Conditions restored within ten minutes.	Not Applicable
9/1/2008	Main Sump	A high level alert for the Building 18 main sump occurred on 9/1/2008. The secondary main sump pump automatically activated and was sufficient to prevent flooding.	Not Applicable
10/27/2008	Main Sump	A high level alert for the Building 18 main sump occurred on 10/27/2008. The secondary main sump pump automatically activated and was sufficient to prevent flooding.	Not Applicable
11/26/2008	Main Sump Pump P-1	Pump P-1 replaced due to pumping problems.	Not Applicable

2.3 Hydraulic Control and Capture Zone Analysis

Building 18 extraction and monitoring well construction details are summarized in Table 6. Measured depth to groundwater during 2008 in the Building 18 monitoring wells ranged from 23.27 to 30.09 feet below ground surface, representing groundwater elevations ranging from 23.27 ft to 30.09 feet above mean sea level.

2.3.1 Methodology

Capture zone analysis is the process of evaluating field observations of hydraulic heads and ground-water chemistry to estimate the capture zone achieved by the groundwater extraction system (RW-25A), and then comparing the estimated capture zone at specific measurement events to a “Target Capture Zone” to determine if capture is sufficient (USEPA, 2008).

Capture from Well RW-25A was estimated for March and November 2008 by graphical flow net evaluation of estimated groundwater flow streamlines drawn perpendicular to groundwater contours in March and November 2008 to derive time-dependent estimated capture zone snapshots. The graphical analysis was guided by calculated distances to the stagnation point and capture zone width based on the analytical solution of Javandel and Tsang (1986). Because the calculation method assumes a homogeneous, isotropic, two-dimensional groundwater flow zone and is dependent on a regionally estimated value of transmissivity, the calculated distances are of secondary importance and primary weight is afforded to measured water level data and the resulting potentiometric surface.

2.3.2 Estimated Capture Zones for 2008

Capture in the vicinity of former Building 18, is accomplished by one SCRW, A-zone well RW-25. The following six steps were used for the Building 18 capture evaluation:

- Step 1:** Review Site data, Site conceptual model, and remedy objectives (Sections 1 and 2 of this report).
- Step 2:** Define Site-specific Target Capture: The horizontal target capture area for the Site SCRW is the modeled capture zone depicted in the final remedial design document for the MEW area south of Highway 101 shown on Figure 3 (Canonie, 1994; Smith, 1996). The vertical target capture is groundwater in the A-zone.
- Step 3:** Interpret water levels: Potentiometric surface maps of the horizontal components of groundwater flow in the A zone using data for the entire MEW area were used for graphical flow net analysis. The groundwater flow map is presented in the RGRP report (Weiss 2009B).
- Step 4:** Perform calculations: The calculated capture zone width and stagnation point for RW-25A are provided in Table 5. This table presents the:
- Estimated flow rate calculation
 - Capture zone width calculation
- Step 5:** Evaluate concentration trends for wells outside of the target capture zone (Section 2.4)-- The figures in Appendix B present TCE, cis-1,2-dichloroethene (cis-1,2-DCE), and VC concentrations over time for Site monitoring and extraction wells. The figures indicate stable or declining TCE concentrations in downgradient monitoring wells beyond the Site capture zone (e.g., wells 80A, 147A).
- Step 6:** Interpret actual capture based on flow net analysis of potentiometric surface (step 3) using calculated distances (Step 4) as a guide; compare to Target Capture Zone(s), and assess uncertainties and data gaps (Section 5.2).

Based on converging lines of evidence from Steps 1-6 above, adequate horizontal and vertical capture was achieved in RW-25A during 2008. Graphical flow net evaluation in March and November indicated greater horizontal capture than the target capture, and vertical capture in the A-zone was adequate based on well RW-25A being screened across the A Zone.

2.3.3 Horizontal and Vertical Gradients

Vertical gradients at the MEW site are generally upward from the B1- to the A-zone, but are locally downward in some areas of the Site (HLA, 1987). Vertical gradients below the B1-zone are generally upward (Geosyntec et al, 2008). Extensive groundwater extraction has affected both lateral and vertical gradients at the Site.

2.4 VOC Analytical Results

The 2008 annual groundwater sample event at the Site was conducted in November 2008. Chemical analytic results for the previous five years (2003 through 2008) are provided in Table 4. VOC versus time graphs for Building 18 monitoring wells and extraction well are included in Appendix B. Appendix C contains the QA/QC evaluation report and summary tables. TCE isoconcentration contour maps for 2008 are included in the MEW RGRP 2008 Annual Progress Report (Weiss, 2009b).

The data provided in Table 4 and Appendix B show that for the monitoring wells sampled in 2008, VOC concentrations in groundwater continue to remain well below historical maximums and concentrations appear to have stabilized over the past ten years based on visual inspection of the time concentration graphs in Appendix B. VOC concentrations in all wells and the Building 18 sump have shown a long-term decrease in VOC concentrations. Although the long term trend has persisted in the monitoring wells and sump, the VOC concentrations of in RW-25A have been on an increasing trend in recent years. Because these concentrations represent the groundwater being captured by the remedy, the increasing trend is not a concern with respect to remedy performance.

3. OTHER ACTIVITIES

3.1 Optimization Evaluation for Groundwater

In response to a request from USEPA³, an Optimization Evaluation Report for the Fairchild sites in the MEW area was submitted to USEPA September 3, 2008 (Geosyntec et al, 2008). The evaluation considered previous efficiency evaluations at the Site (Northgate, 2007a-c and 2008a and b), and recommended implementing an optimization program for the Fairchild sites in conjunction with similar optimization programs for the RGRP and other facilities. The MEW Companies are awaiting USEPA comments on the Optimization Evaluations prior to implementing the recommended programs.

3.2 Air/ Vapor Intrusion

The MEW companies have completed Site investigation and feasibility studies of remedial alternatives to address the vapor intrusion pathway at the Site. In addition, Interim Remedial Measures were temporarily implemented in Building 18. The Interim Measure was discontinued when the Building 18 was vacated in December 2007.

3.2.1 Supplemental RI/FS

A *Draft Supplemental Remedial Investigation Report for Vapor Intrusion* report (Draft RI; dated August 14, 2006) and a *Draft Supplemental Feasibility Study Report* (Draft FS; dated October 16, 2006) were submitted to the USEPA to evaluate the remedial alternatives to mitigate the potential vapor intrusion pathway in the MEW area (Locus, 2006a, 2006b). The USEPA provided comments on both reports on November 15, 2007. A *Revised Supplemental Feasibility Study for Vapor Intrusion* was submitted in January 2008 (Locus, 2008a) and a *Revised Supplemental Remedial Investigation* report was submitted to the USEPA in February 2008 (Locus, 2008b). Comments on the RI/FS were received June 2, 2009, and the USEPA plans to issue a proposed plan for a ROD amendment to address vapor intrusion in 2009.

3.2.2 Building 18 Status

Building 18 was sold and vacated in December 2007. It is scheduled for demolition, and the area will be redeveloped as an office/parking complex. The Interim Remedial Measure installed in the basement of Building 18 to mitigate the vapor intrusion pathway was shut down after the building was vacated. The building remains unoccupied, and no additional air sampling is scheduled for 2009.

³ Letter from USEPA to MEW Parties dated 5 June 2008,

3.3 Annual Settlement Survey

An annual settlement survey was performed on December 17, 2008. The purpose of these annual measurements is to evaluate any potential adverse effects on the Site facilities, and whether long-term remedial groundwater extraction could affect soil settlement in the MEW study area. Geosyntec reviewed the historical settlement and water level elevation data and concluded that the measured values of ground elevation change do not appear to be related to groundwater extraction operations. Furthermore, the changes are relatively uniform over a large area, whereas settlement induced stress is typically caused by differential settlement over the scale of a single building footprint. Additional information on the settlement survey can be found in the RGRP 2008 Annual Progress Report (Weiss, 2009a).

4. PROBLEMS ENCOUNTERED

There were no unexpected O&M difficulties or costs, exceedences, or Notices of Violation during this reporting period. Section 2.2 provides a summary of all non-routine O&M events that occurred at the Building 18 Site, all of which were related to the Building 18 basement dewatering sump that is slated for demolition.

5. TECHNICAL ASSESSMENT

The following assessment of the groundwater remedy performance for Building 18 was made based on data collected through 2008:

- The remedy is functioning as intended. Based on the 2008 data, the extraction system and basement dewatering system continued to function as intended. An Annual Remedy Performance Checklist is included in Appendix A.
- The capture zone is adequate. Extraction well RW-25A achieved adequate capture in 2008. Graphical flow net evaluation in March and November indicated greater horizontal capture than the target capture. There is no vertical component to the capture evaluation because the extraction well, RW-25A, is screened in the same hydrostratigraphic zone as the target capture (A-Zone).
- VOC concentrations are decreasing over time. VOC concentrations in groundwater show long-term decreasing trends in all wells (Appendix B). The long term trend has persisted in all wells except the extraction well RW-25A, where a slight increasing trend has been observed in recent years. Because RW-25A represents captured groundwater, the increasing trend is not a concern for remedy performance.

6. CONCLUSIONS AND RECOMMENDATIONS

During 2008, RW-25A achieved adequate horizontal and vertical capture based on converging lines of evidence including graphical flow net analysis and groundwater concentration trends. RW-25A operated near its target flow rate of 5.5 gallons per minute (gpm) without significant downtime.

Groundwater VOC concentrations in Building 18 monitoring wells continue to remain well below historical maximums and show a long-term decreasing trend.

Upon receipt of comments from USEPA, recommendations from the Optimization evaluation for the Fairchild Sites should be implemented. Planned actions during 2009 include continued operations and maintenance of RW-25A and Building 18 dewatering sump. In addition there will be continued coordination of 644 National Avenue redevelopment throughout 2009.

7. UPCOMING WORK IN 2009 AND PLANNED FUTURE ACTIVITIES

Activities for 2009 include the following:

- Submitting a Notice of Intent to continue treatment operations beyond June 2009 as part of permit renewal activities for Fairchild System 1;
- Responding to USEPA comments on the September 3, 2008 Optimization Evaluation and implementing approved recommendations;
- Five Year Review September 2009; and,
- Continued coordination with USEPA on the Proposed Plan for a ROD amendment for vapor intrusion.

The effectiveness and progress of Building 18 remedial actions during 2009 will continue to be evaluated by continuing operation, maintenance, and monitoring of RW-25A, measuring water levels, and analyzing water samples in accordance with the Site monitoring and reporting schedule. Site-specific data collected during 2009 will be summarized in the Annual Progress Report, which will be submitted to the USEPA by June 15, 2010.

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FIGURES

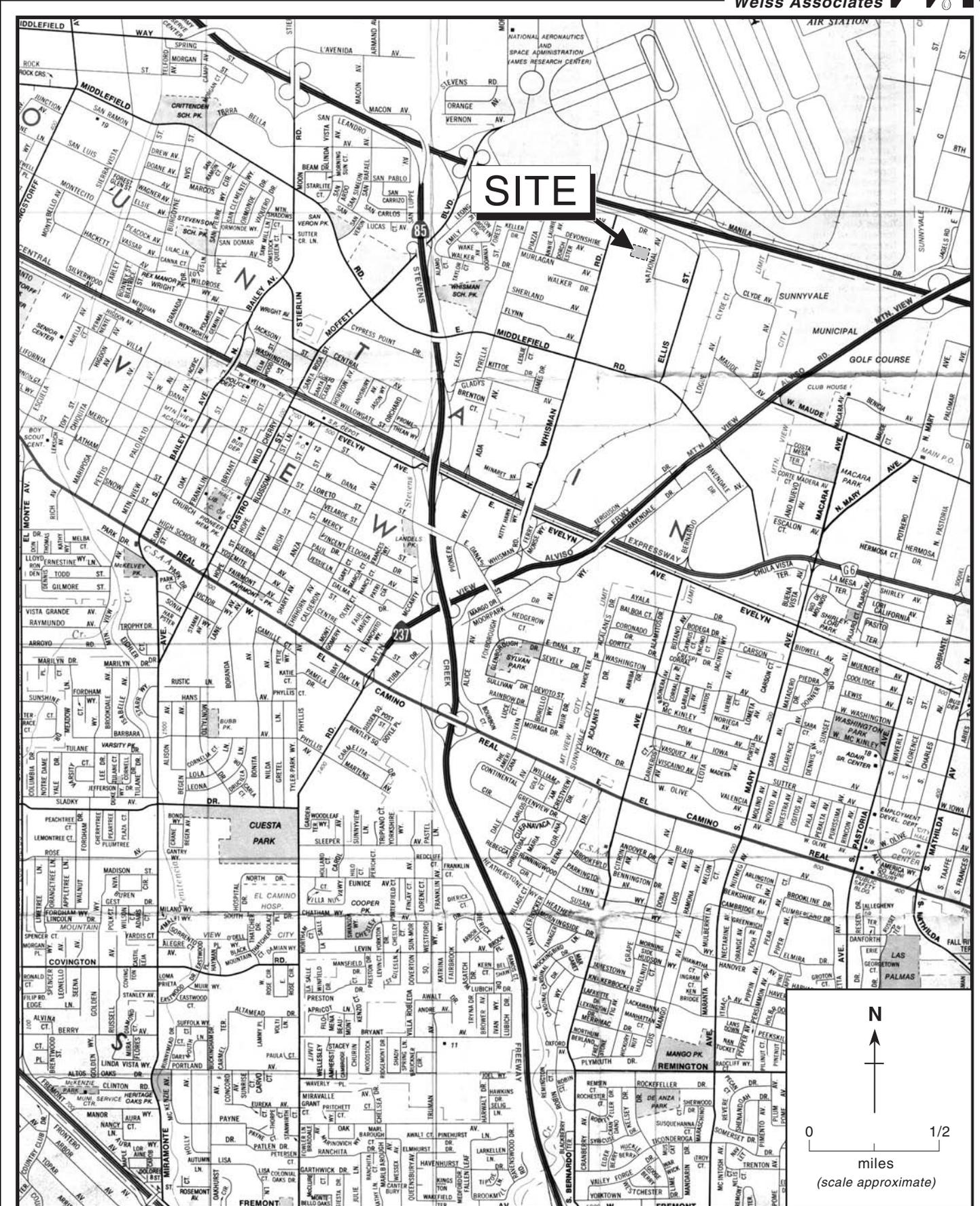


Figure 1. Site Location Map, Former Fairchild Building 18, 644 National Avenue, Mountain View, California



Legend

Building 18 Remedy Components

- Source Recovery Well, On
- Monitoring Well

Extraction and Monitoring Wells in the Vicinity

- ▣ Regional Recovery Well
- ▲ Source Recovery Well
- Monitoring Well

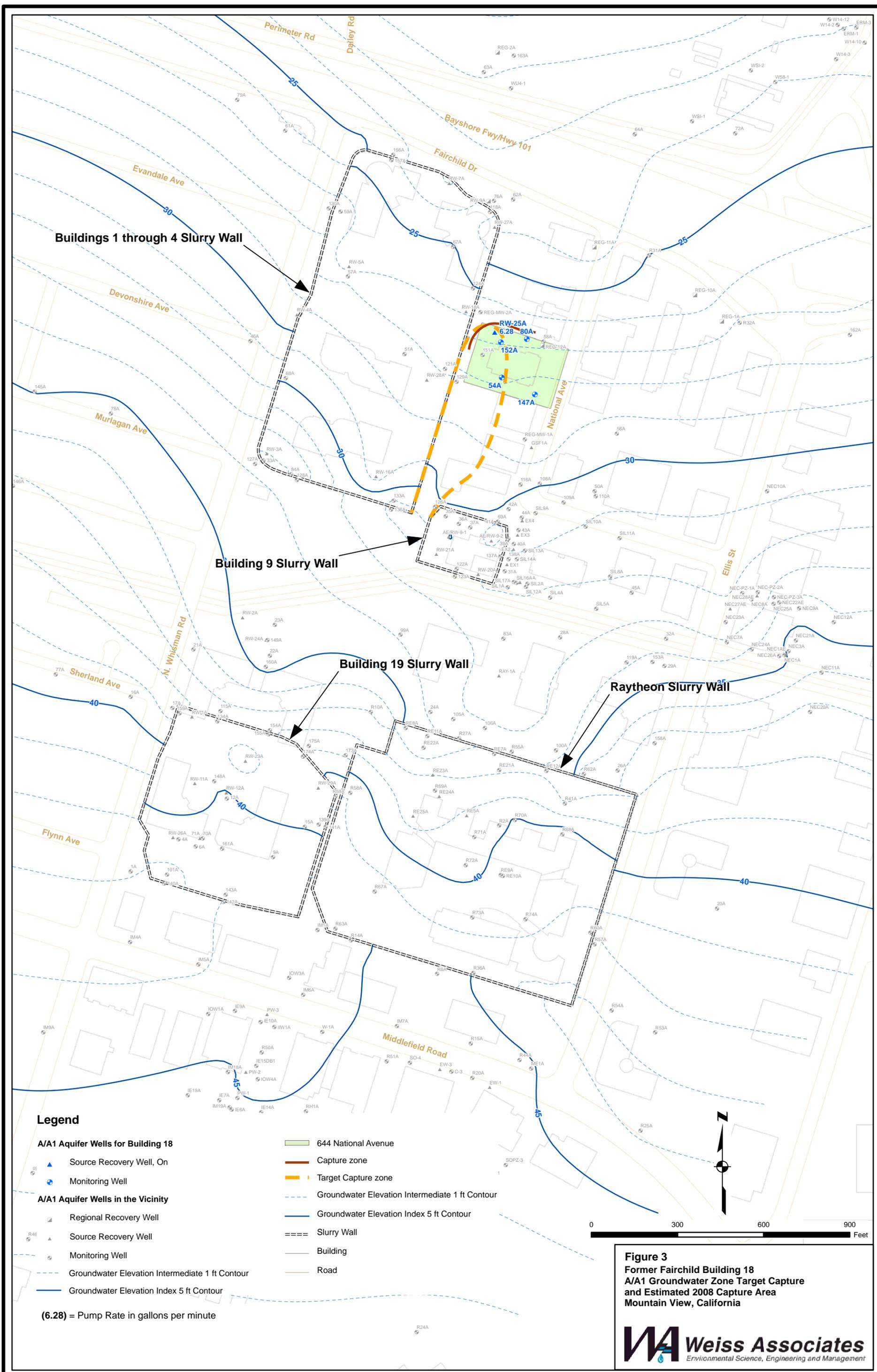
- 644 National Avenue
- RGRP - South
- Groundwater Treatment Plant
- Slurry Wall
- Building
- Road
- Treatment-System Pipeline
- Treatment-System Discharge Pipeline

0 300 600 900 Feet

Figure 2

**Former Fairchild Building 18
Site Map and Well Network
Mountain View, California**





TABLES

Table 1. 2008 Monitoring and Reporting Schedule, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
147A											1,o	
152A											1,o	
54A											1,o	
80A											1,o	
RW-25A											1,o	
36B2											1,o	
BLDG-18											2,o	
Water Levels			X								X	
Annual Progress Report						X						

Notes and Abbreviations:

USEPA = United States Environmental Protection Agency

pH = power of hydrogen ion

1 = wells sampled annually by USEPA Method 8010MS for volatile organic compounds

2 = sample from building sump collection system is analyzed by USEPA Method 8010MS for volatile organic compounds

o = standard observations, including field analysis for pH, temperature, and conductivity

Table 2. Monthly Average Flow Rates (gallons per minute), January through December 2008, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Well ID	January	February	March	April	May	June	July	August	September	October	November	December
Bldg. 18 ¹	34.85	35.46	33.09	14.99	43.62	28.39	28.83	29.15	29.00	26.77	28.02	28.84
RW-25A	4.99	5.38	5.41	5.43	5.78	6.04	7.56	6.08	5.75	5.57	5.58	5.21
Total	39.85	40.84	38.50	20.42	49.40	34.43	36.39	35.23	34.74	32.33	33.59	34.05

Notes and Abbreviations:

Bldg. 18 = Building 18 basement dewatering sump system

1 = Water extracted at Building 18 is plumbed to Treatment System 1. However, during carbon changes or other extended shut downs at System 1 water is pumped to South of 101 Treatment System.

Calculated average flow rate for Bldg 18 was 30 gpm and for RW-25A was 5.8 gpm.

Table 3. Monthly Extraction Totals (gallons), January through December 2008, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

	January	February	March	April	May	June	July	August	September	October	November	December
Bldg 18 - pumped to System 1	1,505,677	1,267,393	1,612,168	604,281	1,773,799	1,430,729	1,072,849	1,175,372	1,407,914	1,030,927	1,210,415	1,327,322
Bldg 18 - pumped to S101	---	60,452	55,420	---	47,962	---	48,055	---	53,611	48,373	---	42,925
Bldg 18 (total) ¹	1,505,677	1,327,845	1,667,588	604,281	1,821,761	1,430,729	1,120,904	1,175,372	1,461,525	1,079,300	1,210,415	1,370,247
RW-25A	215,752	201,329	272,619	219,078	241,214	304,490	293,783	245,007	289,590	224,422	240,862	247,517
Total	1,721,429	1,529,174	1,940,207	823,359	2,062,975	1,735,219	1,414,687	1,420,379	1,751,115	1,303,722	1,451,277	1,617,764

Notes and Abbreviations:

Bldg. 18 = Building 18 basement dewatering sump system.

1 = Water extracted at Building 18 is plumbed to Treatment System 1. However, during carbon changes or other extended shut downs at System 1 water is pumped to South of 101 Treatment System.

Table 4. Chemical Analytic Results Summary, January 2004 through December 2008, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOC's
<----- micrograms per liter (µg/L) ----->															
54A	11/16/04	CT/8260	<8.3	9.2	<8.3	<8.3	400	41	<83	<83	<8.3	<8.3	840	<8.3	1,290
54A	11/18/05	CT/8260	<13	11	<6.3	13	200	<6.3	14	<250	<6.3	<6.3	1,400	<6.3	1,638
54A	11/13/06	CT/8260	<20	12	<10	16	230	<10	14	<400	<10	<10	1,400	<10	1,672
54A	11/14/07	CT/8260	<10	8.5	<5	13	470	9.4	7.8	<200	<5	<5	1,000	<5	1,509
54A	11/15/08	CT/8260	<13	8.2	<6.3	7.4	210	13	8.5	<250	<6.3	<6.3	830	<6.3	1,077
80A	02/12/04	CT/8260	<1.3	2.2	<1.3	3.6	100	<1.3	<13	<13	<1.3	1.3	290	<1.3	397
80A	11/18/05	CT/8260	<6.3	<3.1	<3.1	<3.1	110	<3.1	<3.1	<130	<3.1	<3.1	290	<3.1	400
80A	11/20/06	CT/8260	<2.5	2.6	<1.3	4.3	160	1.3	3.5	<50	1.3	1.4	310	<1.3	484
80A	11/09/07	CT/8260	<4	2.7	<2	3.3	130	2.4	2.3	<80	<2	<2	260	<2	401
80A	11/11/08	CT/8260	<1	2.1	<0.5	3.5	84	1.3	2.7	<20	1	1.7	230	<0.5	326
147A	02/12/04	CT/8260	<0.6	<0.6	<0.6	<0.6	10	<0.6	<6.3	<6.3	0.7	1	140	<0.6	152
147A	11/09/04	CT/8260	<1	<1	<1	<1	9.7	<1	<1	<40	<1	1	140	<1	151
147A	11/16/05	CT/8260	<1.7	<0.8	<0.8	<0.8	8.3	<0.8	1	<33	<0.8	1.3	150	<0.8	161
147A	11/20/06	CT/8260	<2	<1	<1	<1	10	<1	1	<40	<1	1	140	<1	152
147A	11/09/07	CT/8260	<2	<1	<1	<1	10	<1	<1	<40	<1	<1	120	<1	130
147A	11/11/08	CT/8260	<1	0.6	<0.5	0.6	13	<0.5	1.1	<20	0.7	1.2	130	<0.5	147
152A	02/12/04	CT/8260	<6.3	<6.3	<6.3	11	1,400	31	<63	<63	<6.3	<6.3	1,100	17	2,559
152A	11/11/04	CT/8260	<2.5	<2.5	<2.5	<2.5	130	3.5	5.1	<100	<2.5	<2.5	400	3	542
152A	11/18/05	CT/8260	<20	<10	<10	<10	1,500	13	<10	<400	<10	<10	850	30	2,393
152A	11/20/06	CT/8260	<40	<20	<20	<20	2,700	<20	<20	<800	<20	<20	1,100	160	3,960
152A	11/09/07	CT/8260	<40	<20	<20	20	2,700	28	<20	<800	<20	<20	1,000	120	3,868
152A	11/11/08	CT/8260	<1	3.5	<0.5	8.5	780	7.1	2.9	<20	<0.5	1.4	430	70	1,303
BLDG-18	11/24/08	CT/8260	<7.1	<3.6	<3.6	<3.6	300	12	<3.6	<140	<3.6	<3.6	510	4.8	827
RW-25A	02/12/04	CT/8260	<7.1	7.7	<7.1	11	1,100	16	<71	<71	<7.1	<7.1	1,400	32	2,567
RW-25A	11/11/04	CT/8260	<5	<5	<5	7.3	640	23	25	<200	<5	<5	1,100	16	1,811
RW-25A	11/18/05	CT/8260	<25	<13	<13	<13	920	<13	19	<500	<13	<13	1,300	32	2,271
RW-25A	11/21/06	CT/8260	<40	<10	<10	17	1,400	20	72	<400	<10	<10	1,700	37	3,246
RW-25A	11/16/07	CT/8260	<33	<17	<17	24	2,600	29	42	<670	<17	<17	2,200	91	4,986
RW-25A	11/07/08	CT/8260	<25	<13	<13	20	2,100	25	39	<500	<13	<13	2,100	55	4,339

Table 4. Chemical Analytic Results Summary, January 2004 through December 2008, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Sample Location	Sample Date	Lab/Analytical Method	Chloroform	1,1-DCA	1,2-DCA	1,1-DCE	cis-1,2-DCE	trans-1,2-DCE	Freon 113	Methylene Chloride	PCE	1,1,1-TCA	TCE	Vinyl Chloride	Total VOC's
<----- micrograms per liter (µg/L) ----->															
RW-25A (DUP)	11/07/08	CT/8260	<40	<20	<20	21	2,100	24	44	<800	<20	<20	2,100	55	4,344
36B2	11/16/04	CT/8260	<20	<20	<20	<20	400	<20	<200	<200	<20	<20	2,800	<20	3,200
36B2	11/18/05	CT/8260	<25	<13	<13	<13	230	<13	190	<500	<13	<13	4,400	<13	4,820
36B2	11/13/06	CT/8260	<100	<50	<50	<50	230	<50	370	<2,000	<50	<50	11,000	<50	11,600
36B2	11/12/07	CT/8260	<100	<50	<50	<50	240	<50	390	<2,000	<50	<50	12,000	<50	12,630
36B2	11/15/08	CT/8260	<71	<36	<36	<36	180	<36	120	<1,400	<36	<36	6,000	<36	6,300

Notes and Abbreviations:

< # = analyte not detected above the reported detection limit of "#" µg/L
 8260 = USEPA Method 8260B for halogenated VOCs, for USEPA Method 8010 list of analytes
 CT = Curtis and Tompkins, Berkeley, California
 DCA = Dichloroethane
 DCE = Dichloroethene
 DUP = duplicate sample
 ND = no analytes detected above the laboratory detection limit
 PCE = Tetrachloroethene
 TCA = Trichloroethane
 TCE = Trichloroethene
 VOCs = volatile organic compounds
 Well 36B2 is a MEW RGRP well; not facility-specific.

Table 5. Capture Zone Calculations and Analysis, Former Fairchild Building 18, Mountain View, California

Extraction Well:		RW-25A
b		18
i		0.004
K		141.120
T		2470
w		80
estimated well loss (ft):	$s_w = CQ^2$	0.006
Average extraction rate (gpm):	Nov-08	5.58
flow budget (gpm):	$Q = K \times (b \times w) \times i \times \text{factor}$	6.16
stagnation point (ft):	$X_0 = -Q / 2\pi Ti$	-17.32
capture zone width (at extraction well; ft)	$Y_{\text{well}} = \pm Q / 4Ti$	27.19
capture zone width (maximum; ft):	$Y_{\text{max}} = \pm Q / 2Ti$	54.37

LINE OF EVIDENCE	CAPTURE?	COMMENTS
<p><u>Water Levels</u></p> <p><i>potentiometric surface maps</i></p>	<i>Adequate.</i>	<i>Potentiometric surface maps indicate horizontal capture of the target capture area.</i>
<p><u>Calculations</u></p> <p><i>flow budgets</i></p> <p><i>capture zone widths</i></p>	<i>Adequate.</i>	<i>The current average pumping rate is similar to the calculated flow budget for the former source area. The calculated capture zone width and stagnation point is smaller than what is interpreted from flow net analysis (potentiometric surface maps).</i>
<p><u>Concentration Trends</u></p> <p><i>downgradient monitoring wells</i></p>	<i>Adequate.</i>	<i>Concentrations are decreasing in downgradient monitoring wells. Site VOC plume size and magnitude is decreasing.</i>

Notes and Abbreviations:

- b = aquifer or saturated thickness (ft)
- C = turbulent well loss coefficient from Walton, 1962 (sec²/ft⁵); the following are coefficients and their corresponding well condition:
 - 5 = properly designed and developed, 5 to 10 = mild deterioration, 10 to 40 = severe deterioration (40 used in the calculation)
- factor = accounts for other contributions to the extraction well (a factor of 1.5 was used in the calculation)
- i = regional hydraulic gradient (ft/ft)
- K = hydraulic conductivity (ft/day)
- Q = extraction flow rate (gallons per minute; gpm)
- s_w = drawdown due to well loss
- T = transmissivity (ft²/day)
- w = plume width (ft) (the width of the former source area, 80 ft, is used in the calculation)
- X₀ = stagnation point (ft)
- Y_{max} = maximum capture zone width (ft)
- Y_{well} = capture zone width in-line w/ extraction well (ft)

Assumptions:

- homogeneous, isotropic, confined aquifer of infinite extent
- uniform regional horizontal hydraulic gradient
- no net recharge (or net recharge is accounted for in regional hydraulic gradient)
- no other sources of water introduced into aquifer due to extraction
- uniform aquifer thickness
- fully penetrating extraction well
- steady-state flow
- negligible vertical gradient

Table 6. Extraction and Monitoring Well Details, 644 National Avenue, Mountain View (Former Fairchild Building 18)

Well Details	Date Installed	Zone	TOC Elevation (ft amsl)	Diameter (inches)	Total Well Depth (ft btoc)	Top of Screened Interval (ft btoc)	Bottom of Screened Interval (ft btoc)	Top of Sand Pack (ft btoc)	Bottom of Sand Pack (ft btoc)	Pump Depth (midpoint) (ft)	Well Type
147A	12/12/88	A	39.13	4	30	10	30	7	31	0	Mon
152A	10/10/91	A	39.53	4	34.5	14.50	34.5	12.5	34.5	0	Mon
54A	02/02/82	A	40.17	2	40	14	40	14	40	0	Mon
80A	08/08/85	A	38.09	4	33	23	31	21	33	0	Mon
RW-25A	----	A	38.38	6	31	21	31	18	32	0	Ext
143B1	11/11/86	B1	38.88	4	70	60	70	56	76	0	Mon
36B2	08/08/85	B2	37.65	4	92.5	86	91	81.5	92.5	0	Mon

Notes and Abbreviations:

--- = date installed not available

Zone = A, B1, B2, or C water-bearing zone

ft amsl = feet above mean sea level

ft btoc = feet below top-of-casing

Well Type = extraction well (Ext), monitoring well (Mon)

APPENDIX A

2008 ANNUAL REPORT REMEDY PERFORMANCE CHECKLIST

2008 Annual Report Remedy Performance Checklist

I. GENERAL SITE INFORMATION			
Facility Name: Former Fairchild Facilities, Middlefield-Ellis-Whisman Study Area (MEW Site)			
Facility Address, City, State: 515/545 North Whisman Road and 313 Fairchild Drive (former Bldgs. 1-4) <div style="text-align: center; padding: 5px;"> 369 and 441 North Whisman Road (former Bldgs. 13 and 19 and 23) 401 National Avenue (former Bldg. 9) 644 National Avenue (former Bldg. 18) 464 Ellis Street (former Bldg. 20 and 20A) </div>			
Checklist completion date: June 3, 2009	EPA Site ID: System-1: CAR000164285 System-3: CAD095989778 System-19: CAR000164228		
Site Lead: <input type="checkbox"/> Fund <input checked="" type="checkbox"/> PRP <input type="checkbox"/> State <input type="checkbox"/> State Enforcement <input type="checkbox"/> Federal Facility <input type="checkbox"/> Other: EPA Region IX			
Site Remedy Components (Include Other Reference Documents for More Information, as appropriate):			
<ol style="list-style-type: none"> 1. Three slurry wall enclosures around former Buildings 1-4, Building 9, and Building 19. The slurry walls extend to a depth of about 40 feet below ground surface and are keyed a minimum of two feet into the A2/B1 aquitard. 2. Three treatment systems as detailed below: <ul style="list-style-type: none"> System 1: <ul style="list-style-type: none"> • Three 5,000-pound GAC vessels in series, treatment pad, controls, double-contained groundwater conveyance piping, vaults, electrical distribution, controls and other appurtenances. • Thirteen source control recovery wells (Four wells operated during 2008). • One regional recovery wells (One well operated during 2008). System 3: <ul style="list-style-type: none"> • Three 5,000-pound GAC vessels in series, treatment pad, controls, double-contained groundwater conveyance piping, vaults, electrical distribution, controls and other appurtenances. • Seven source control recovery wells (Five wells operated during 2008). • Three regional recovery wells (Two wells operated during 2008). System 19: <ul style="list-style-type: none"> • Three 5,000-pound GAC vessels in series, treatment pad, controls, double-contained groundwater conveyance piping, vaults, electrical distribution, controls and other appurtenances. • Fifteen source control recovery wells (Ten operated during 2008). • Seven regional recovery wells (Two operated during 2008). 			
II. CONTACTS			
<u>List important personnel associated with the Site:</u> Name, title, phone number, e-mail address:			
	Name/Title	Phone	E-mail
RP/Facility Representative	Du'Bois (Joe) Ferguson Schlumberger Technology Corporation	281-285-3692	dferguson3@sugar-land.oilfield.slb.com
RP Consultant	John Gallinatti Geosyntec Consultants	510-285-2750	jgallinatti@geosyntec.com
RP Consultant	Tess Byler Weiss Associates	650-968-7000	tb@weiss.com

2008 Annual Report Remedy Performance Checklist

III. O&M COSTS (OPTIONAL)
<p>What is your annual O&M cost total for the reporting year? _____</p> <p>Breakout your annual O&M cost total into the following categories (use either dollars or %):</p> <ul style="list-style-type: none"> • Analytical (e.g., lab costs): _____ • Labor (e.g., site maintenance, sampling): _____ • Materials (e.g., treatment chemicals): _____ • Oversight (e.g., project management): _____ • Utilities (e.g., electric, gas, phone, water): _____ • Reporting (e.g., NPDES, progress): _____ • Other (e.g., capital improvements): _____
<p>Describe unanticipated/unusually high or low O&M costs (go to section [fill in] to recommend optimization methods):</p>
IV. ON-SITE DOCUMENTS AND RECORDS (Check all that apply)
<p> <input checked="" type="checkbox"/> O&M Manual <input checked="" type="checkbox"/> O&M Maintenance Logs <input type="checkbox"/> O&M As-built drawings <input checked="" type="checkbox"/> O&M reports <input checked="" type="checkbox"/> Daily access/Security logs <input checked="" type="checkbox"/> Site-Specific Health & Safety Plan <input checked="" type="checkbox"/> Contingency/Emergency Response Plan <input checked="" type="checkbox"/> O&M/OSHA Training Records <input checked="" type="checkbox"/> Settlement Monument Records <input type="checkbox"/> Gas Generation Records <input checked="" type="checkbox"/> Groundwater monitoring records <input type="checkbox"/> Leachate extraction records <input checked="" type="checkbox"/> Discharge Compliance Records <input type="checkbox"/> Air discharge permit <input checked="" type="checkbox"/> Effluent discharge permit <input checked="" type="checkbox"/> Waste disposal, POTW Permit </p> <p>Are these documents currently readily available? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, where are records kept?</p> <p>Documents and records are available at treatment systems and/or on-site office located at, 350 E. Middlefield Road Mountain View, CA</p>
V. INSTITUTIONAL CONTROLS (as applicable)
<p>List institutional controls called for (and from what enforcement document):</p> <p>Signs and other security measures are in place at extraction and treatment points.</p> <p>Status of their implementation:</p> <p>Posted signage (Health & Safety and emergency contact information). Bay Alarm Security System at the site.</p> <p>Where are the ICs documented and/or reported?</p> <p>ICs are being properly implemented and enforced? <input type="checkbox"/> Yes <input type="checkbox"/> No, elaborate below ICs are adequate for site protection? <input type="checkbox"/> Yes <input type="checkbox"/> No, elaborate below</p>
<p>Additional remarks regarding ICs:</p>

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VI. SIGNIFICANT SITE EVENTS Check all Significant Site events Since the Last Checklist that Affects or May Affect Remedy Performance
<input type="checkbox"/> Community Issues <input type="checkbox"/> Vandalism <input checked="" type="checkbox"/> Maintenance Issues <input type="checkbox"/> Other:
Please elaborate on Significant Site Events: Maintenance issues: System 19: During 2008, the extraction and treatment system operated within the effluent limits established by the site NPDES permit for the entire period. However, the treatment system shut down from July 7-14 for approximately 165 hours without any alarm notification. There was no treatment unit bypass or discharge during the system shut down. Based on communication with Water Board staff on September 30, 2008, any future shut downs greater than 120 hours will be orally reported within five days of shut down, and a written submission within 15 days of shut down. Additional non-routine maintenance issues are reported in Section 2 of the facility-specific 2008 Annual Progress Reports.
VII. REDEVELOPMENT
Is redevelopment on property planned? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, what is planned? Please describe below. Is redevelopment plan complete Yes, date: _____; <input checked="" type="checkbox"/> No ? <input type="checkbox"/> Not Applicable Redevelopment proposal in progress? <input checked="" type="checkbox"/> Yes, elaborate below <input type="checkbox"/> No; If no, is a proposal anticipated? <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Is the redevelopment proposal compatible with remedy performance? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Elaborate on redevelopment proposal and how it affects remedy performance: Planned and ongoing redevelopment in the residential area over the western edge of the MEW A/A1 and B1/A2 zone plume. Planned redevelopment of apartments on Whisman Road; ongoing redevelopment of residential area on Fairchild Drive, west of Whisman Road. Building 18, the 644 National Avenue property has been bought by Carr America National Avenue LLC; redevelopment plans include new buildings and a parking structure. The existing treatment systems and their components (conveyance piping, extraction wells, and monitoring wells) will be maintained or modified as appropriate to accommodate redevelopment.

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VIII. GROUNDWATER REMEDY (reference isoconcentration, capture zone maps, trend analysis, and other documentation to support analysis)	
<u>Groundwater Quality Data</u> List the types of data that are available:	What is the source report?
<u>Potentiometric surface maps, hydrographs</u>	<u>2008 Annual Reports & 5-Year Review</u>
<u>Capture zone maps, isoconcentration maps</u>	
<hr/> <ul style="list-style-type: none"> ■ Contaminant trend(s) tracked during O&M (i.e., temporal analysis of groundwater contaminant trends). ■ Groundwater data tracked with software for temporal analyses. <input type="checkbox"/> Reviewed MNA parameters to ensure health of substrate (e.g., DO, pH, temperature), if appropriate? 	
<u>Groundwater Pump & Treat Extraction Well and Treatment System Data</u> List the types of data that are available:	What is the source report?
<u>O&M logs</u>	<u>NPDES Reports</u>
<u>System Influent & Effluent water samples</u>	<u>2008 Annual Reports</u>
<u>VOC mass and groundwater removal graphs, VOC concentration trends</u>	
<ul style="list-style-type: none"> ■ The system is functioning adequately. <input type="checkbox"/> The system has been shut down for significant periods of time in the past year. Please elaborate below. 	
<u>Discharge Data</u> List the types of data that are available:	What is the source report?
<u>System performance data such as average flow rates, totalized flow, influent/effluent analyticals, GAC removal efficiencies</u>	<u>NPDES Discharge Reports</u>
<ul style="list-style-type: none"> ■ The system is in compliance with discharge permits. 	
<u>Slurry Wall Data</u> List the types of data that are available:	What is the source report?
<u>Water level elevations in select well pairs</u>	<u>2008 Annual Reports & 5-Year Review</u>
<u>Analysis of inward and upward hydraulic gradients</u>	
<hr/> <p>Is slurry wall operating as designed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If not, what is being done to correct the situation?</p> <p>The slurry walls are operating as designed. However, the ROD specifies that the slurry walls, “maintain inward and upward gradients.” Historically, that has not been the case in the downgradient direction even under maximum historical pumping scenarios. Since 2007, pumping ceased in the lower concentration/higher pumping rate extraction wells within the slurry walls. Gradients have maintained trends consistent with those prior to reduced groundwater extraction rates within the slurry wall. In one case, a change in gradient from inward to outward was observed in the cross-gradient direction in one of the three slurry walls (Buildings 1-4) in May 2008. In August and November, gradient measurements were inward again.</p> <p>The chemical concentration data and potentiometric surface contours continue to demonstrate that the slurry walls are an effective means of impeding VOC migration outside of the slurry walls.</p>	
<u>Elaborate on technical data and/or other comments</u>	

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IX. AIR MONITORING/VAPOR INTRUSION PATHWAY EVALUATION (Include in Annual Progress Report and reference document)
<p>Walk-throughs/Surveys: N/A</p> <p>No additional air work was conducted at 401 and 644 National Avenue in 2008.</p>
<p>Summary of Results: N/A</p> <p>Problems Encountered: None</p> <p>Recommendations/Next Steps: None</p>
<p>Schedule: All work is coordinated with the USEPA.</p>
X. REMEDY PERFORMANCE ASSESSMENT
A. Groundwater Remedies
<p>What are the remedial goals for groundwater? <input checked="" type="checkbox"/> Plume containment (prevent plume migration); <input checked="" type="checkbox"/> Plume restoration (attain ROD-specific cleanup levels in aquifer); <input type="checkbox"/> Other goals, please explain:</p> <p>The groundwater remedy is hydraulic remediation by extraction and treatment. The Treatment System is reliable and consistent in its operation and mass removal ability, with greater than 95% up-time. The capture zones from the extraction wells provide sufficient overlap to achieve hydraulic control over the plume based on flow net evaluation and converging lines of evidence, including stable lateral extent of TCE exceeding 5 µg/L. Remediation is also demonstrated because concentrations within the TCE plume have continued to decrease in all zones. Groundwater with TCE concentrations exceeding 5 µg/L does not discharge to surface water.</p> <p>Have you done a trend analysis? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No; If Yes, what does it show?</p> <p>(Is it inconclusive due to inadequate data? Are the concentrations increasing or decreasing?) Explain and provide source document reference</p> <p>Concentrations within the core of the TCE plume have continued to decrease in all zones, while the lateral extent of TCE exceeding 5 µg/L has been stable. See Annual Reports for trends in monitoring wells (Appendix D) and the Optimization Evaluation Report (Geosyntec et al., 2008) for change in TCE distribution over time (Figures 4-18 through 4-21).</p> <p>While the lateral extent of TCE concentrations exceeding 5 µg/L has not grown since 1992 and concentrations within TCE plume have generally decreased by an order of magnitude or more, the perimeter extent of TCE concentrations has largely stabilized. Optimization of the remedy may therefore be warranted (Geosyntec et al, 2008).</p>
<p>If plume containment is a remedial goal, check all that apply:</p> <p><input checked="" type="checkbox"/> Plume migration is under control (explain basis below)</p> <p><input type="checkbox"/> Plume migration is not under control (explain basis below)</p> <p><input type="checkbox"/> Insufficient data to determine plume stability (explain below)</p> <p>(Include attachments that substantiate your answers, e.g., reference plume, trend analysis, and capture zone maps in source document)</p>
<p>Elaborate on basis for determining that plume containment goal is being met or not being met:</p> <p>Plume containment goal is met, slurry walls provide physical containment of sources on 369 N. Whisman Road, 401 National Avenue, and 515/545 N. Whisman Road and 313 Fairchild Drive.</p> <p>Groundwater elevation and chemical monitoring results from 2008 demonstrate that the Fairchild extraction wells continue to achieve adequate horizontal and vertical capture based on converging lines of evidence, including graphical flow net analysis and chemical concentration trends. VOC concentrations in groundwater continue to remain well below historical maximums, and generally show long-term decreasing trends.</p>

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If plume restoration is a cleanup objective, check all that apply:

- Progress is being made toward reaching cleanup levels (explain basis below)
- Progress is not being made toward reaching cleanup levels (explain basis below)
- Insufficient data to determine progress toward restoration goal (explain below)

Elaborate on basis for determining progress or lack of progress toward restoration goal:

The objective is to remediate and control the plume. The groundwater extraction, treatment, and containment systems are functioning as intended and meet the Remedial Action Objectives for the Site. While concentrations within TCE plume have generally decreased by an order of magnitude or more, treatment system influent concentrations have declined and the perimeter extent of TCE concentrations has largely stabilized. Optimization of the remedy may therefore be warranted.

B. Vertical Migration

Have you done an assessment of vertical gradients? Yes No; If Yes, what does it show? (Is it inconclusive due to inadequate data?)

Are the concentrations increasing or decreasing? Explain and provide source document reference

In general, vertical gradients across the B and deeper water-bearing zones are upward. Upward vertical gradients are typical from the B- to A-zone, but downward vertical gradients are observed at a few locations.

Source document reference: 2008 Annual Reports & 5-Year Review

C. Source Control Remedies

What are the remedial goals for source control?

Capture of former source areas is the goal for source control. Cleanup standards are Maximum Contaminant Level (MCLs) in upper groundwater zones; the TCE is 5 µg/L.

Elaborate on basis for determining progress or lack of progress toward these goals:

Capture zone analysis in the 2008 Annual Progress Report indicate plume containment of target capture areas.

XI. PROJECTIONS

Administrative Issues

Dates of next monitoring and sampling events for next annual reporting period: Nov/Dec 2009

A. Groundwater Remedies - Projections for the upcoming year and long-term (Check all that apply)

Remedy Projections for the upcoming year (2009)

- No significant changes projected.
- Groundwater remedy will be converted to monitored natural attenuation. Target date:
 - Groundwater Pump & Treat will be shut down. Target date:
 - Groundwater cleanup standards to be modified. Target date:
 - PRP will request remedy modification. Target date of request:
- Change in the number of monitoring wells. Increasing or decreasing? Target date:
- Change in the number and/or types of analytes being analyzed. Increasing or decreasing? Target date:
- Change in groundwater extraction system. Expansion or **minimization** (i.e., number of extraction wells and/or pumping rate)? Target date:
 - Modification on groundwater treatment? Elaborate below. Target date:
 - Change in discharge location. Target date:
- Other modification(s) anticipated: **Optimization** Elaborate below. Target date: **TBD**

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<p>Elaborate on Remedy Projections:</p> <p>The RPs for the Former Fairchild Facilities anticipate implementing remediation optimization strategies, pending receipt of and response to EPA comments on the September 3, 2008 Optimization Evaluation Report.</p>
<p><u>Remedy Projections for the long-term</u> (Check all that apply)</p> <p><input type="checkbox"/> No significant changes projected.</p> <p><input type="checkbox"/> Groundwater remedy will be converted to monitored natural attenuation. Target date:</p> <p><input type="checkbox"/> Groundwater Pump & Treat will be shut down. Target date:</p> <p><input type="checkbox"/> Groundwater cleanup standards to be modified. Target date:</p> <p><input type="checkbox"/> PRP will request remedy modification. Target date of request:</p> <p><input type="checkbox"/> Change in the number of monitoring wells. <input type="checkbox"/> Increasing or <input type="checkbox"/> decreasing? Target date:</p> <p><input type="checkbox"/> Change in the number and/or types of analytes being analyzed. <input type="checkbox"/> Increasing or <input type="checkbox"/> decreasing? Target date:</p> <p><input type="checkbox"/> Change in groundwater extraction system. <input type="checkbox"/> Expansion or <input type="checkbox"/> minimization (i.e., number of extraction wells and/or pumping rate)? Target date:</p> <p><input type="checkbox"/> Modification on groundwater treatment? Elaborate below. Target date:</p> <p><input type="checkbox"/> Change in discharge location. Target date:</p> <p><input checked="" type="checkbox"/> Other modification(s) anticipated: <u>Groundwater Feasibility Study</u> Elaborate below. Target date: TBD</p>
<p>Elaborate on Remedy Projections:</p> <p>Minor changes to the EPA's January 15, 2009 Draft Process Framework for a site-wide Groundwater Feasibility Study were proposed January 30, 2009. The PRPs are prepared to implement the modified Framework as soon as the Draft Framework is finalized by EPA .</p>
<p>B. Projections – Slurry Walls (Check all that apply)</p>
<p><u>Remedy Projections for the upcoming year</u></p> <p><input type="checkbox"/> No significant changes projected.</p> <p><input type="checkbox"/> PRP will request remedy modification. Target date of request:</p> <p><input type="checkbox"/> Change in the number of monitoring wells. <input type="checkbox"/> Increasing or <input type="checkbox"/> decreasing? Target date:</p> <p><input checked="" type="checkbox"/> Other modification(s) anticipated: <u>Optimization</u> Elaborate below. Target date: TBD</p>
<p>Elaborate on Remedy Projections:</p> <p>The slurry walls are part of the groundwater remedy. The recommendations of the Optimization Evaluation Report will be implemented upon receipt of, and response to, comments from EPA. In the interim, the system continued to operate per the August 2007 groundwater extraction scheme.</p>
<p><u>Remedy Projections for the long-term</u></p> <p><input type="checkbox"/> No significant changes projected.</p> <p><input type="checkbox"/> PRP will request remedy modification. Target date of request:</p> <p><input type="checkbox"/> Change in the number of monitoring wells. <input type="checkbox"/> Increasing or <input type="checkbox"/> decreasing? Target date:</p> <p><input type="checkbox"/> Other modification(s) anticipated: <u>Groundwater Feasibility Study</u> Elaborate below. Target date: TBD</p>
<p>Elaborate on Remedy Projections:</p> <p>See above. The slurry walls are part of the groundwater remedy.</p>
<p><u>C. Projections – Other Remedial Options Being Reviewed to Enhance Cleanup</u></p> <p>Progress implementing recommendations from last report or Five-Year Review Has optimization study been implemented or scheduled? <input checked="" type="checkbox"/> Yes; <input type="checkbox"/> No; If Yes, please elaborate.</p> <p>An Optimization Evaluation Report was submitted September 2008.</p>

2008 Annual Report Remedy Performance Checklist

XII. ADMINISTRATIVE ISSUES

Check all that apply:

- Explanation of Significant Differences in progress ROD Amendment in progress
 Site in operational and functional ("shake down") period;
 Notice of Intent to Delete in progress Partial site deletion in progress TI Waivers
 Other administrative issues:

Proposed Plan to address vapor intrusion pathway planned for 2009, with ROD amendment to follow.

Date of Next EPA Five-Year Review: **September 30, 2009**

XII. RECOMMENDATIONS

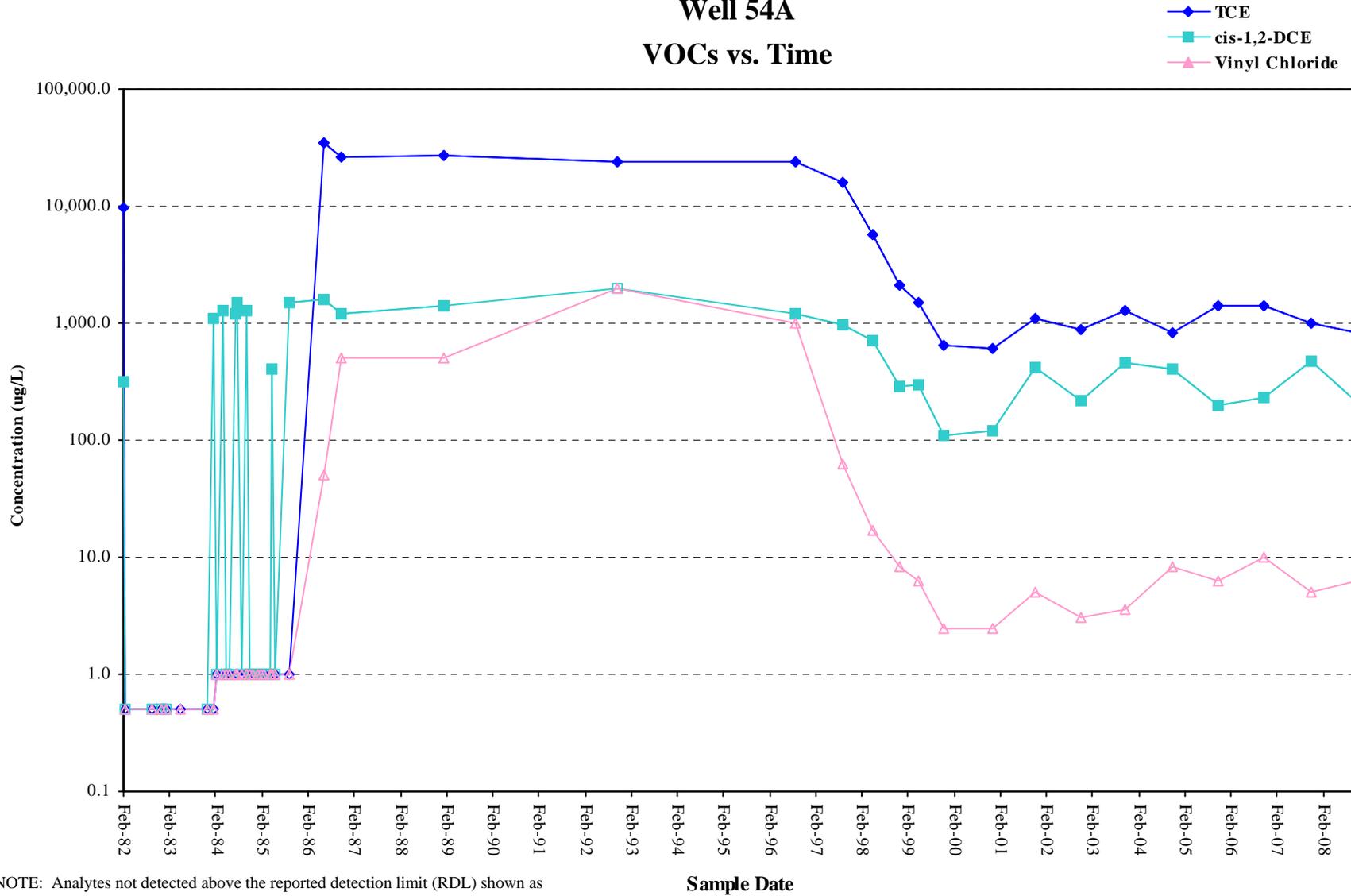
- **Implement optimization strategies for Fairchild systems pending receipt of and response to EPA comments on the Optimization Evaluation Report.**
- **Follow revised groundwater feasibility study framework pending finalization by EPA.**
- **Potentially responsible parties (PRPs) requested in the 2008 Annual Progress Report that USEPA not require further facility-specific reporting for Former Fairchild Building 20 beginning in 2009. However, this request has not yet been acknowledged by the USEPA. The PRPs are requesting again to discontinue additional facility-specific reporting for Former Fairchild Building 20. The rationale for this request is:**
 1. **No potential source areas were identified at former Fairchild Building 20 property during Site investigations.**
 2. **Analytical results for the monitoring wells sampled in 2008 continue to indicate that VOC concentrations in groundwater are generally stable to declining. This is also reported in the RGRP Annual report.**
 3. **Building 20 does not have an associated groundwater treatment system.**
 4. **There is no facility-specific capture to evaluate.**

In summary, the groundwater monitoring data are evaluated in the RGRP report, and this report is redundant with other reports at the MEW Site since all information is covered under Raytheon Facility Specific and RGRP reporting.

APPENDIX B

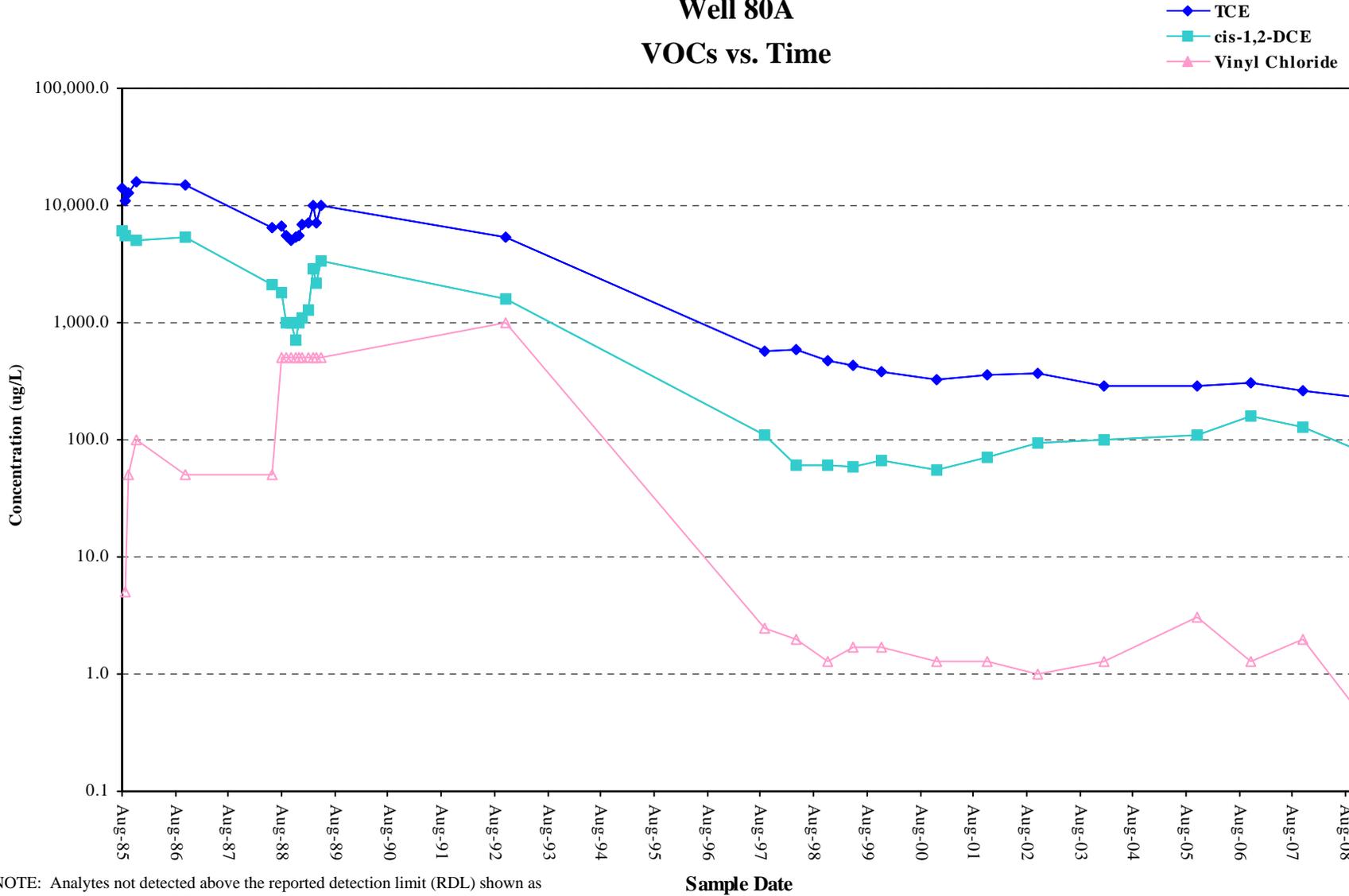
SELECTED VOCS VERSUS TIME GRAPHS

Well 54A VOCs vs. Time

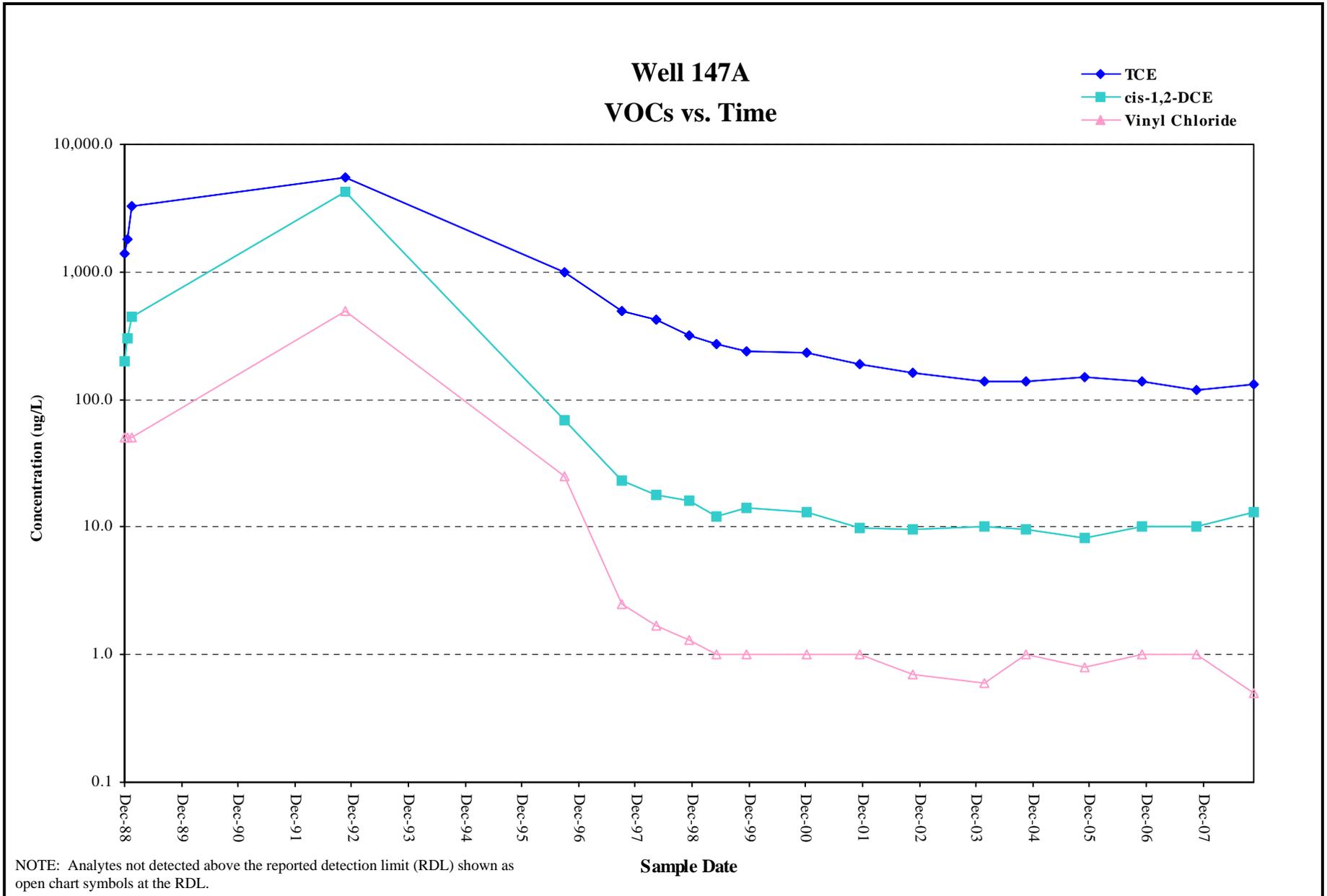


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

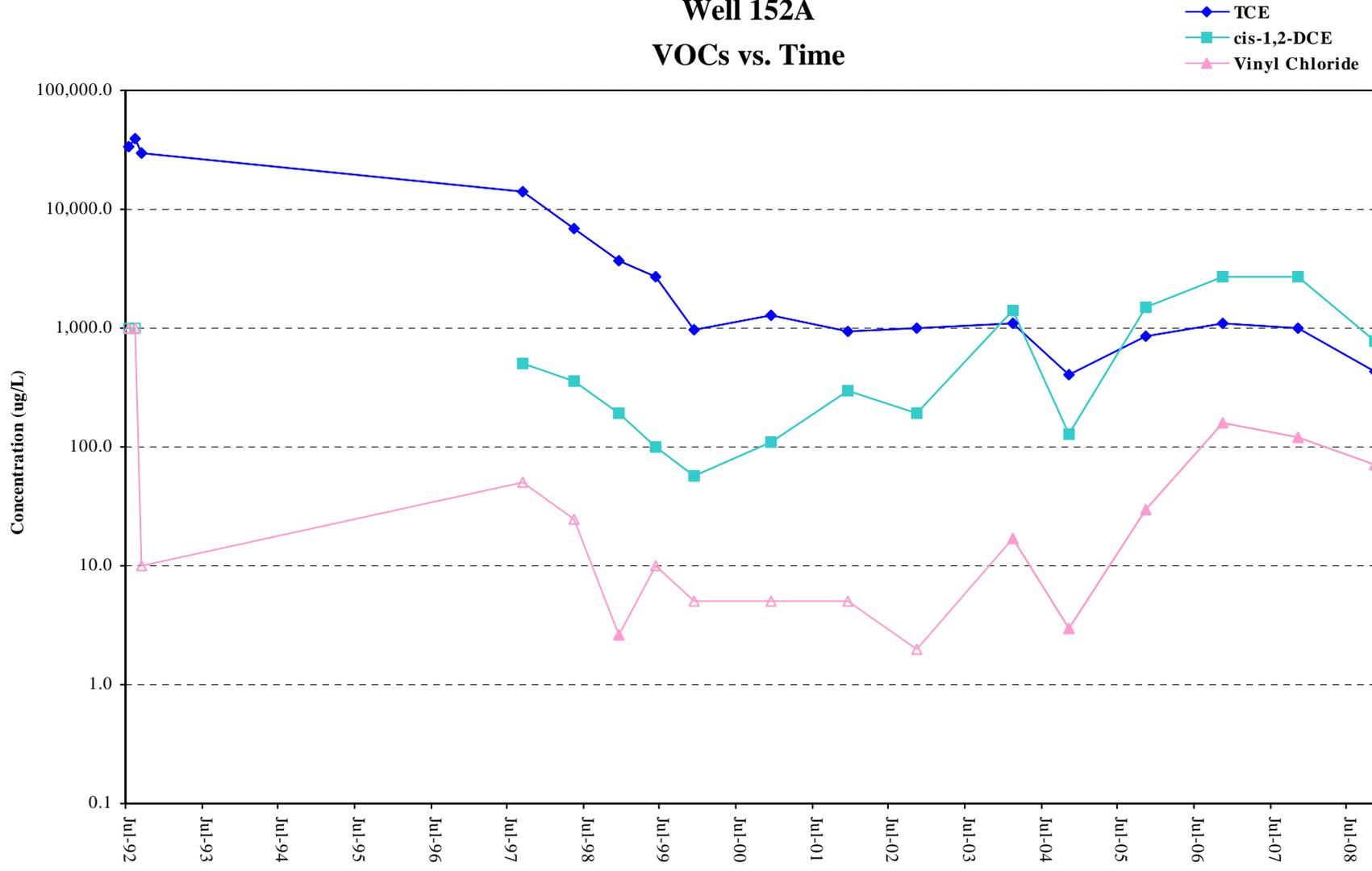
Well 80A VOCs vs. Time



NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.



Well 152A VOCs vs. Time

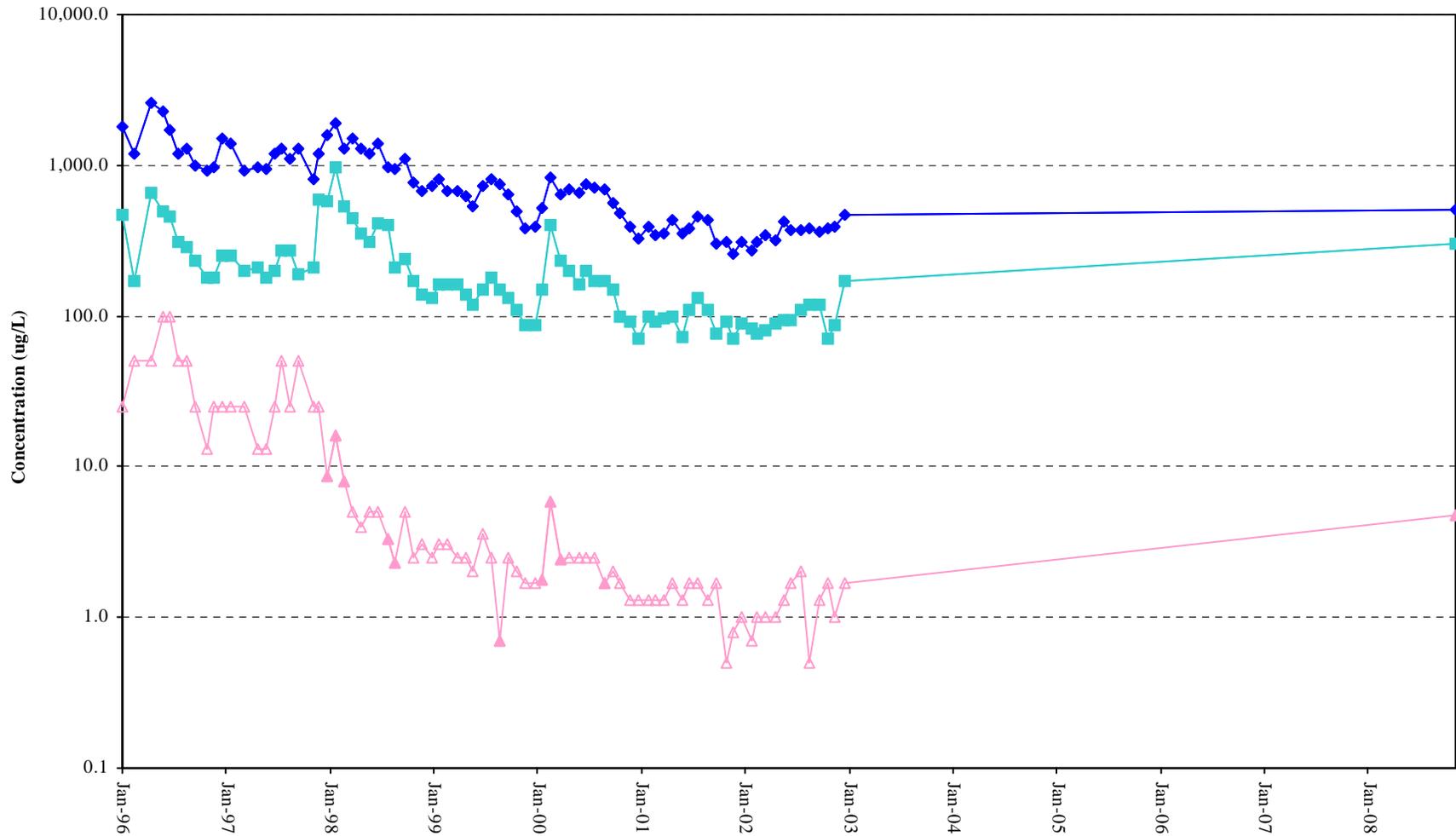


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Sample Date

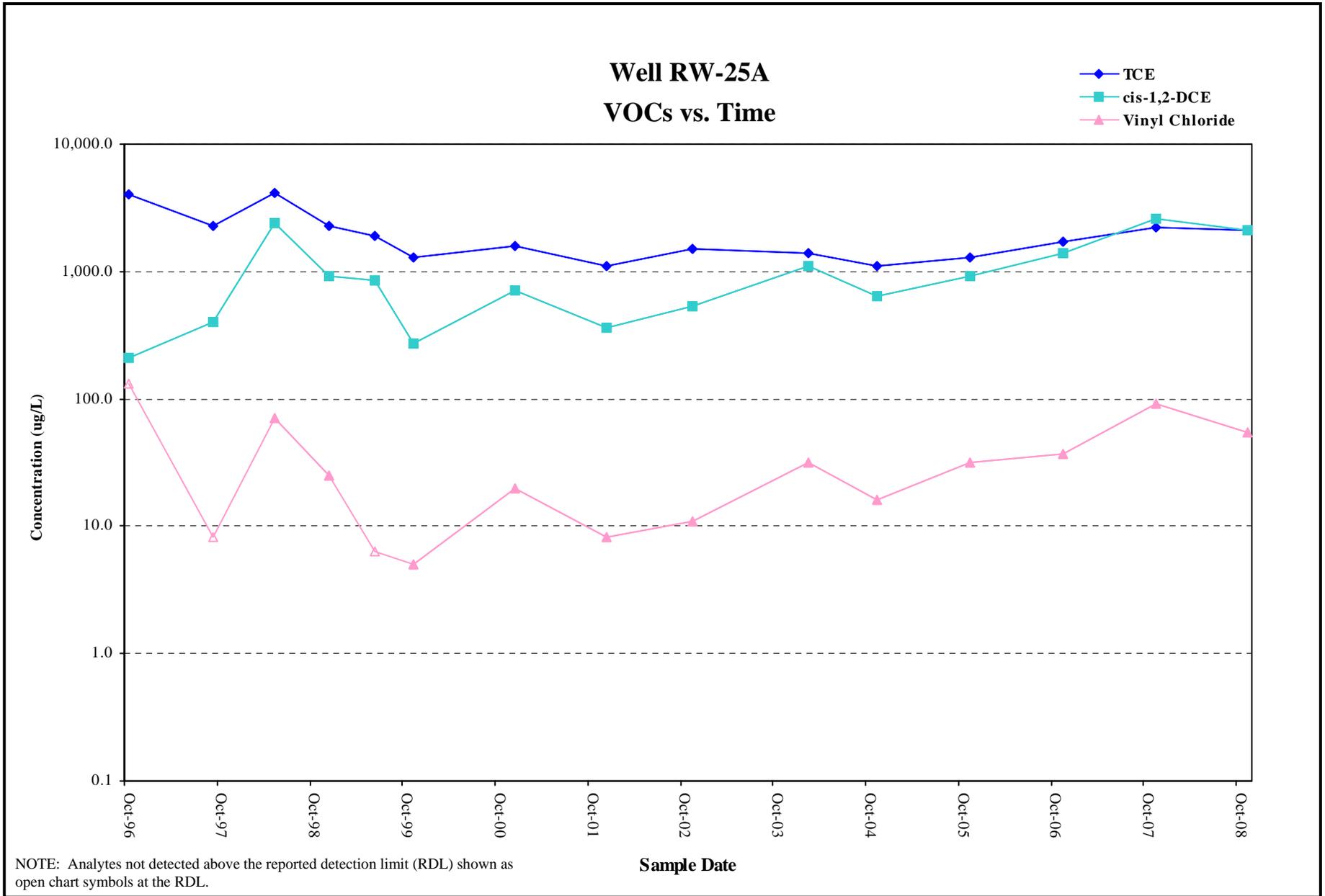
Well BLDG-18 VOCs vs. Time

◆ TCE
■ cis-1,2-DCE
▲ Vinyl Chloride

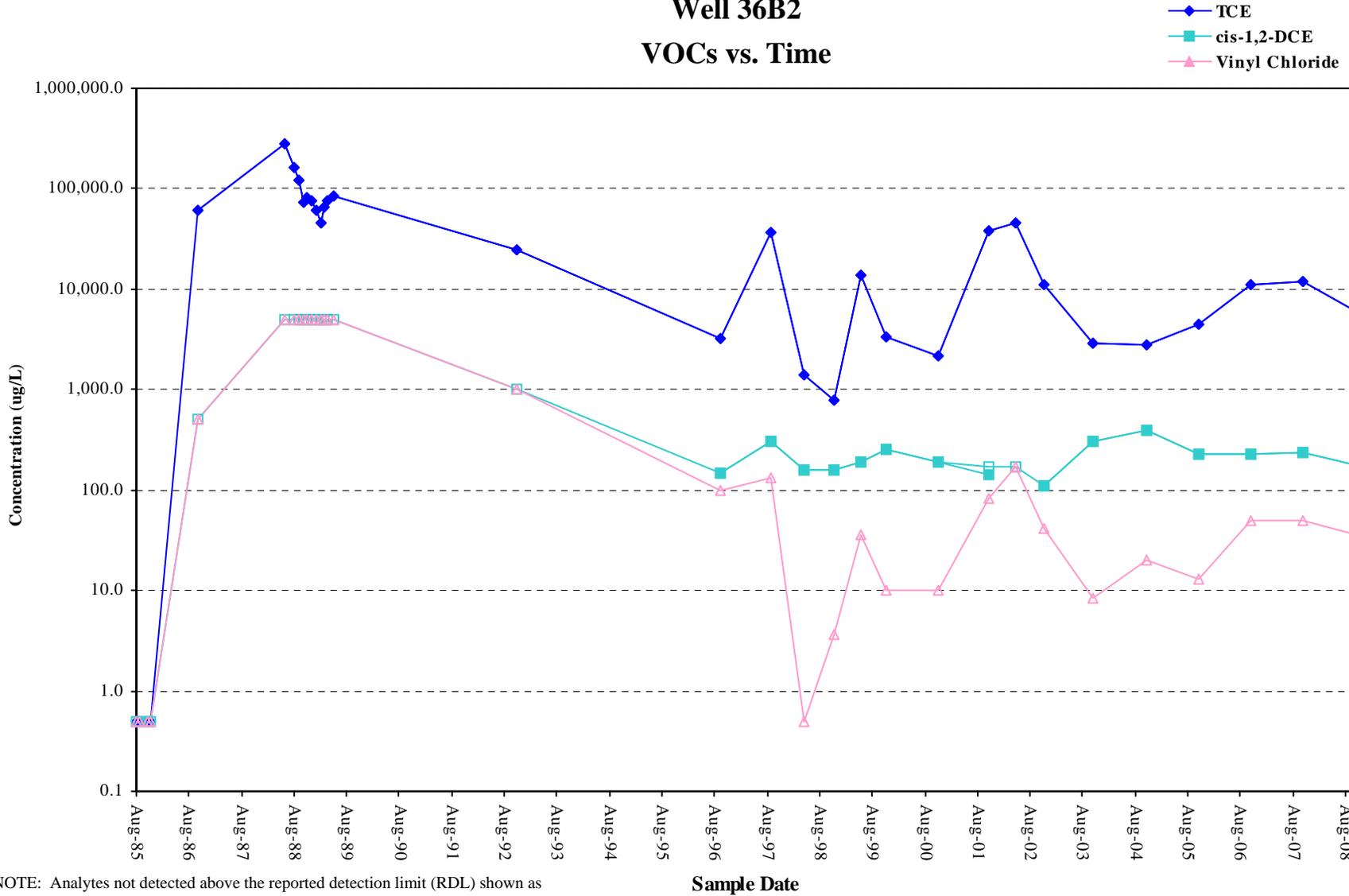


NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

Sample Date



Well 36B2 VOCs vs. Time



NOTE: Analytes not detected above the reported detection limit (RDL) shown as open chart symbols at the RDL.

APPENDIX C

QA/QC REPORT, SUMMARY TABLES, AND CRITERIA

2008 QA/QC SUMMARY

From January through December 2008, the sump collection system for Building 18 (644 National Avenue) pumped to Fairchild System 1, (515 Whisman Road) where combined influent is sampled monthly as required by the NPDES permit. Six groundwater samples were collected at the Site as part of the MEW RGRP annual groundwater sample event. Samples (including QC samples) were submitted to Curtis and Tompkins in Berkeley, California, a state-certified analytical laboratory. All samples were collected, stored, transported and managed according to USEPA protocols. Sample temperature and holding times were correctly observed. Tables C-1 and C-2 present a summary of sampling and analysis QA/QC for 2008. Analytical laboratory reports for the groundwater and related QC samples (travel blanks, rinseate/equipment blanks, and field blanks) are presented in Appendix F of the MEW 2008 Annual Progress Report. Appendix G of the MEW 2008 Annual Progress Report summarizes the analytical issues (Table G-2) and the results of the QC samples (Table G-3) for the 2008 annual groundwater sampling event.

Table C-1. Summary of Sampling QA/QC for January through December 2008, Former Fairchild Building 18, 644 National Avenue, Mountain View, California.

Who performed sampling (Firm name/address/contact/phone):	Weiss Associates 350 Middlefield Road Mountain View, CA 94043 Joyce Adams (510) 450-6162
Chain of Custody forms completed for all samples?	YES
Field parameters stabilized prior to taking sample?	YES
Zero headspace in sample containers (applicable to VOCs only)?	YES
Samples preserved according to analytical method?	YES
Required field QA/QC samples taken?	YES

*Explain any "NO" answers:

Table C-2. Summary of Analytical QA/QC for January through December 2008, Former Fairchild Building 18, 644 National Avenue, Mountain View, California

Who performed analysis (Lab name/address/contact/phone):	Curtis & Tompkins 2323 Fifth Street Berkeley, CA 94710 Anna Pajarillo (510) 486-0900
Analytical methods (by method number and chemical category):	Six samples analyzed by USEPA 8260B – Halogenated Volatile Organic Compounds
Are the labs state-certified for the above analytical methods?	YES
Analyses performed according to standard methods?	YES
Sample holding times met?	YES
Analytical results reported for all values above MDL?	YES
QA/QC analyses run consistent with analytical methods?	YES
QA/QC results meet all acceptance criteria?	YES ^{1,2}
QA/QC results and acceptance criteria on file?	YES

*Explain any “NO” answers:

1. The Analytic Reports and Chain of Custody forms are located in Appendix F of the *2008 Annual Progress Report for Middlefield-Ellis-Whisman Study Area Regional Groundwater Remediation Program, Mountain View, CA*.

2. Analytical issues for treatment systems samples collected during 2008 are reported in the 2008 Quarterly NPDES reports for Treatment System 1. Analytical issues for groundwater samples collected during the 2008 annual groundwater sampling event are summarized in Appendix G of the *2008 Annual Progress Report for Middlefield-Ellis-Whisman Study Area Regional Groundwater Remediation Program, Mountain View, CA*.